

AC/II(23-24).2.RUS3

S. P. Mandali's
Ramnarain Ruia Autonomous College
(Affiliated to University of Mumbai)



Syllabus for UG Biotechnology

Program: S.Y.BSc.

(As per the guidelines of National Education Policy
2020-Academic year 2024-25)

(Choice based Credit System)

GA	GRADUATE ATTRIBUTES A student completing Bachelor's Degree in Science program will be able to:
GA 1	Recall and explain acquired scientific knowledge in a comprehensive manner and apply the skills acquired in their chosen discipline. Interpret scientific ideas and relate its interconnectedness to various fields in science.
GA 2	Evaluate scientific ideas critically, analyse problems, explore options for practical demonstrations, illustrate work plans and execute them, organise data and draw inferences.
GA 3	Explore and evaluate digital information and use it for knowledge upgradation. Apply relevant information so gathered for analysis and communication using appropriate digital tools.
GA 4	Ask relevant questions, understand scientific relevance, hypothesize a scientific problem, construct and execute a project plan and analyse results.
GA 5	Take complex challenges, work responsibly and independently, as well as in cohesion with a team for completion of a task. Communicate effectively, convincingly and in an articulate manner.
GA 6	Apply scientific information with sensitivity to values of different cultural groups. Disseminate scientific knowledge effectively for upliftment of the society.
GA 7	Follow ethical practices at work place and be unbiased and critical in interpretation of scientific data. Understand the environmental issues and explore sustainable solutions for it.
GA 8	Keep abreast with current scientific developments in the specific discipline and adapt to technological advancements for better application of scientific knowledge as a lifelong learner

PROGRAM OUTCOMES

PO	Description
	A student completing Bachelor's Degree in Science program in the subject of Biotechnology will be able to:
PO 1	Adept in basic sciences along with a thorough understanding of biotechnology principles and chemical sciences to create a foundation for higher education with the insights into interdisciplinary approach.
PO 2	Demonstrate the applications of fundamental biological processes from the molecular, cellular, industrial and environmental perspective.
PO 3	Develop effective communication skills with improved individual and team work abilities in the domain of scientific research writing. Showcase their innovative ideas and research work efficiently.
PO 4	Reflect, analyse and interpret information or data for investigating the problem in fields of biotechnology. Acquire scientific and entrepreneur skills to furnish sustainable solutions to coeval problems
PO 5	Illustrate the relevance of ethical implications and standard laboratory practices in tissue culture techniques, forensic biology, developmental biology and other fields of biotechnology.
PO 6	Apply the conceptual knowledge to develop coherent, efficacious and proficient practical, technical and analytical skills.

Credit Structure for SYBSc. Biotechnology 24-25

Semester	Subject 1 (Major)		Subject 2 (Minor)	GE/OE course	Vocational and Skill Enhancement Course (VSC) & SEC	Ability Enhancement Course/VEC/IKS	OJT/FP/CEP CC, RP	Total Credits
	DSC	DSE						
3	Major 8 4*2/ (3T+1P) *2		Minor 4 (3T+1P)	2	VSC-2-Major	AEC-2 MIL (Marathi/Hindi)	FP -2, CC-2	22
4	Major 8 4*2/ (3T+1P) *2		Minor 4 (3T+1P)	2	SEC-2	AEC-2 MIL (Marathi/Hindi)	CEP-2, CC-2	22
Total	16		8	4	4	4	8	44

Exit option: award of UG Diploma in Major with 88 credits and an additional 4 credit Core NSQF course/ Internship or Continue with Major and Minor

PROGRAMME OUTLINE

YEAR	SEMESTER	PAPER	COURSE CODE	COURSE TITLE	CREDITS
SYBSc	III	DSC-I	RUSBTKMJ0201	IMMUNOLOGY	3
		DSC-I	RUSBTKMJ0201	PRACTICAL BASED ON IMMUNOLOGY	1
		DSC-II	RUSMJBTK0202	PLANT AND ANIMAL PHYSIOLOGY	3
		DSC-II	RUSMJBTK0202	PRACTICAL OF PLANT AND ANIMAL PHYSIOLOGY	1
		MINOR	RUSMIBTK0203	BIOCHEMISTRY	3
		MINOR	RUSMIBTK0202	PRACTICAL BASED ON BIOCHEMISTRY	1
		VSC	RUSVSCBK0201	ANALYTICAL TECHNIQUES IN BIOTECHNOLOGY	2

SYBSc	IV	DSC-I	RUSMJBTKE211	AIR WATER AND SOIL MICROBIOLOGY	3
		DSC-I	RUSMJBTKE211	PRACTICAL BASED ON AIR WATER AND SOIL MICROBIOLOGY	1
		DSC-II	RUSMJBTKE212	MOLECULAR BIOLOGY	3
		DSC-II	RUSMJBTKE212	PRACTICAL BASED ON MOLECULAR BIOLOGY	1
		MINOR	RUSMIBTKE213	BIOPHYSICAL CHEMISTRY	3
		MINOR	RUSMIBTKE213	PRACTICAL BASED ON BIOPHYSICAL CHEMISTRY	1
		SEC	RUSSECBTKE211	BIOINFORMATICS AND BIostatISTICS	2

SEMESTER III**Course Code: RUSVSCBTKPO201****Course Title: Analytical Techniques In Biotechnology****Type of Course: Vocational Skill Course****Academic year 2024-25****COURSE OUTCOMES:**

COURSE OUTCOME	DESCRIPTION A student completing this course will be able to:
CO 1	Explain the optical properties and principles of different microscopic technique/s
CO2	Illustrate the applications of microscopic technique/s in analysis and identification of different biological samples
CO 2	Differentiate between different types of electrophoresis
CO 3	Elaborate on the principle of electrophoresis and demonstrate separation of different biomolecules using suitable electrophoretic technique/s.
CO4	Explain the principle, working and application of different centrifugal technique/s
CO5	Determine suitable centrifugal technique/s for separation of different biomolecules
CO6	Use theoretical principles of chromatography to separate and quantify different components present in a sample.
CO7	Characterize different biomolecules on the basis of their partition coefficient using suitable chromatographic technique/s

DETAILED SYLLABUS

Practical

Course Code: RUSVSCBTK0201	
Sr. No.	Practical Title
1	Study of scanning electron microscope
2.	Study of transmission electron microscope
3.	Extraction of protein from bacteria and fungi
4	Extraction of protein from animal cells
5	Extraction of protein from plant cells
6	Visualisation and profiling and extracted protein from bacteria, fungal, plant and animal cells by native page
7	Visualisation and profiling and extracted protein from bacteria, fungal, plant and animal cells by SDS PAGE
8	Study of proteins by 2D electrophoresis / IEF
9	Study of nucleic acids using agarose gel electrophoresis
10	Study of nucleic acids using capillary electrophoresis
11	Density gradient centrifugation
12	Isopycnic centrifugation

13	TLC of lipids
14	TLC of steroids
15	TLC of alkaloids
16	Separation of sugars using paper chromatography
17	Separation and estimation of secondary metabolites
18	Calibration of micropipette
19	Pka estimation of amino acids using ph meter

References

1. Wilson And Walkers Principles And Techniques Of Biochemistry And Molecular Biology 8Th South Asia Edition 2018 by HOFMANN A, CAMBRIDGE UNIVERSITY PRESS
2. Biophysical chemistry by Upadhyay and Upadhyay nath

MODALITY OF ASSESSMENT**VSC****Practical Examination Pattern:****(Semester end practical examination):**

PARTICULARS	PRACTICAL COMPONENTS
Experimental Tasks	
Major	20
Minor 1	10
Minor 2	10
Journal	05
Viva/spots	05
TOTAL	50